

CLAIMS

What is claimed is:

1. A phyllosilicate-polymer composition comprising:

(a) a phyllosilicate; and

(b) a polymer layer adsorbed onto the basal surface of the phyllosilicate

providing a phyllosilicate-polymer composition, wherein the phyllosilicate-polymer composition is present as a single phyllosilicate-polymer phase and the phyllosilicate-polymer composition exhibits an anomalous basal spacing.

2. The phyllosilicate-polymer composition of claim 1 wherein the polymer has at least one hydroxyl group.

3. The phyllosilicate-polymer composition of claim 1 further comprising a second polymer layer adsorbed onto the basal surface of the phyllosilicate.

4. The phyllosilicate-polymer composition of claim 2 wherein the polymer is selected from the group consisting of polyethylene glycol, polypropylene glycol and monoalkyl ether derivatives thereof.

5. The phyllosilicate-polymer composition of claim 2 wherein the polymer comprises greater than 27 weight percent of the phyllosilicate-polymer composition.

6. The phyllosilicate-polymer composition of claim 2 wherein the exchange sites on the basal surface of the phyllosilicate is bound substantially with hydrogen ions.

7. The phyllosilicate-polymer composition of claim 2 wherein the basal spacing of the phyllosilicate-polymer composition increases as the molecular weight of the polymer increases.

1 8. An anisotropic liquid crystalline composite, comprising:

2 (a) a phyllosilicate-polymer composite, comprising;

3 (1) a phyllosilicate; and

4 (2) a polymer adsorbed onto the phyllosilicate,

5 wherein the phyllosilicate-polymer composite is birefringent.

1 9. The anisotropic liquid crystalline composite of claim 8 wherein the
2 phyllosilicate is nematically oriented in the phyllosilicate-polymer composition.

1 10. The anisotropic liquid crystalline composite of claim 8 wherein the
2 phyllosilicate comprises more than 10 percent of the phyllosilicate-polymer composite.

1 11. The anisotropic liquid crystalline composite of claim 8 wherein the
2 phyllosilicate is selected from the group consisting of kaolins, talcs and montmorillonites.

1 12. The anisotropic liquid crystalline composite of claim 8 wherein the
2 polymer is water soluble.

1 13. The anisotropic liquid crystalline composite of claim 8 further
2 comprising a material selected from the group consisting of polyethylene glycol based
3 surfactants and polypropylene glycol based surfactants.

1 14. The anisotropic liquid crystalline composite of claim 13 further
2 comprising an antioxidant.

1 15. The anisotropic liquid crystalline composite of claim 13 wherein the
2 liquid crystalline composite is extrudable.

1 16. The anisotropic liquid crystalline composite of claim 8 wherein the
2 phyllosilicate-polymer composition comprises a barrier layer, the barrier layer providing a gas
3 permeability below a gas permeability of the polymer alone.

1 17. A method for producing an anisotropic liquid crystalline composite from
2 a phyllosilicate and a polymer comprising:

- 3 (a) suspending a phyllosilicate in a compatible solvent;
4 (b) dissolving a polymer that is soluble in the compatible solvent in the
5 compatible solvent; and
6 (c) removing a sufficient amount of the compatible solvent to produce an
7 anisotropic liquid crystalline composite.

1 18. The method of claim 17 wherein the compatible solvent is water.

1 19. The method of claim 18 wherein the polymer is polyethylene glycol.

2 20. The method of claim 18 wherein the anisotropic liquid crystalline
composite comprises less than about two percent water by weight.

2 21. The method of claim 18 further comprising purifying the phyllosilicate
prior to suspending the phyllosilicate in the compatible solvent.

2 22. The method of claim 18 wherein the anisotropic liquid crystalline
composition comprises between about 30 and 70 percent phyllosilicate.

2 23. The method of claim 18 further comprising adding a polypropylene
glycol or polyethylene glycol based surfactant to the compatible solvent.

3 24. The method of claim 23 further comprising extruding the anisotropic
liquid crystalline composite to produce a barrier layer of the anisotropic liquid crystalline
composite.

3 25. A barrier film for use in packaging and coating applications having
reduced gas permeability comprising an anisotropic liquid crystalline composite layer having a
gas permeability below the gas permeability of a polymer in the liquid crystalline composite.

1 26. The barrier film of claim 25 wherein the film is transparent.

1 27. The barrier film of claim 25 wherein the liquid crystal composite
2 comprises a phyllosilicate and a polymer.

1 28. The barrier film of claim 27 wherein the phyllosilicate comprises greater
2 than ten percent by weight of the liquid crystalline composite layer.

1 29. The barrier film of claim 28 wherein the phyllosilicate comprises
2 between about 30 and about 70 percent by weight of the liquid crystalline composite layer.

1 30. The barrier film of claim 25 wherein the liquid crystalline composite
2 layer comprises an inner layer of a multilayer film.

1 31. The barrier film of claim 25 wherein the liquid crystalline composite
2 layer further comprises a polyethylene glycol based surfactant.